Space Weather Forecast

Issued on Monday, 06 February 2023 at 00:39 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

---

Space Weather Forecast Headline: Chance of G1/Minor Geomagnetic Storm intervals. Probable increase in X-ray flare activity.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the past 24 hours, with X-ray activity generally subdued but with isolated mid-ranking Common-class flares observed. These peaked with an event emanating near the southeast limb at 05/0326UTC and a second similarly-sized flare from a sunspot group in the southwest at 05/1050UTC.

There are now up to six sunspot regions, with one having faded in the southwest as a new faint region developed nearer the solar meridian, also joined by a possible new arrival in the far northeast. All of these sunspot groups generally took the form of small and magnetically simple groups, with the flaring region perhaps the most notable spot as a slowly proliferating and spreading group.

Up to three 'prominence eruptions' (arcs of plasma leaving the Sun as Coronal Mass Ejections (CMEs)) were observed from the southeast in the period. None of these events should affect Earth, and no solar radiation enhancements were seen.

Of potentially greater note was a possible CME associated with the Common-class flare from the southwest at 05/1050UTC. This feature has been analysed and determined to most likely pass the radius of the Earth's orbit ahead of and below the track of the Earth. Yet another possibly noteworthy event was seen from a small Common-class flare from a sunspot in the northeast at 05/1939UTC, however no subsequent CME was identifiable in imagery. No Earth-directed CMEs therefore feature in the forecast at present.

Solar Wind / Geomagnetic Activity: Solar wind parameters were indicative of slow wind regime. The solar wind speed was a Background levels throughout, with an initial slight decrease and then level tendency. The number of particles in the solar wind showed a gradual rise over the same interval to end at Slightly Elevated levels. The magnetic field associated with these particles showed a gradual increase from Background to Slightly Elevated levels by the period's end. The north-south component of the field showed an erratic tendency, with a gradually increasing amplitude.

The net result of the above solar wind measures was for quiet geomagnetic activity.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

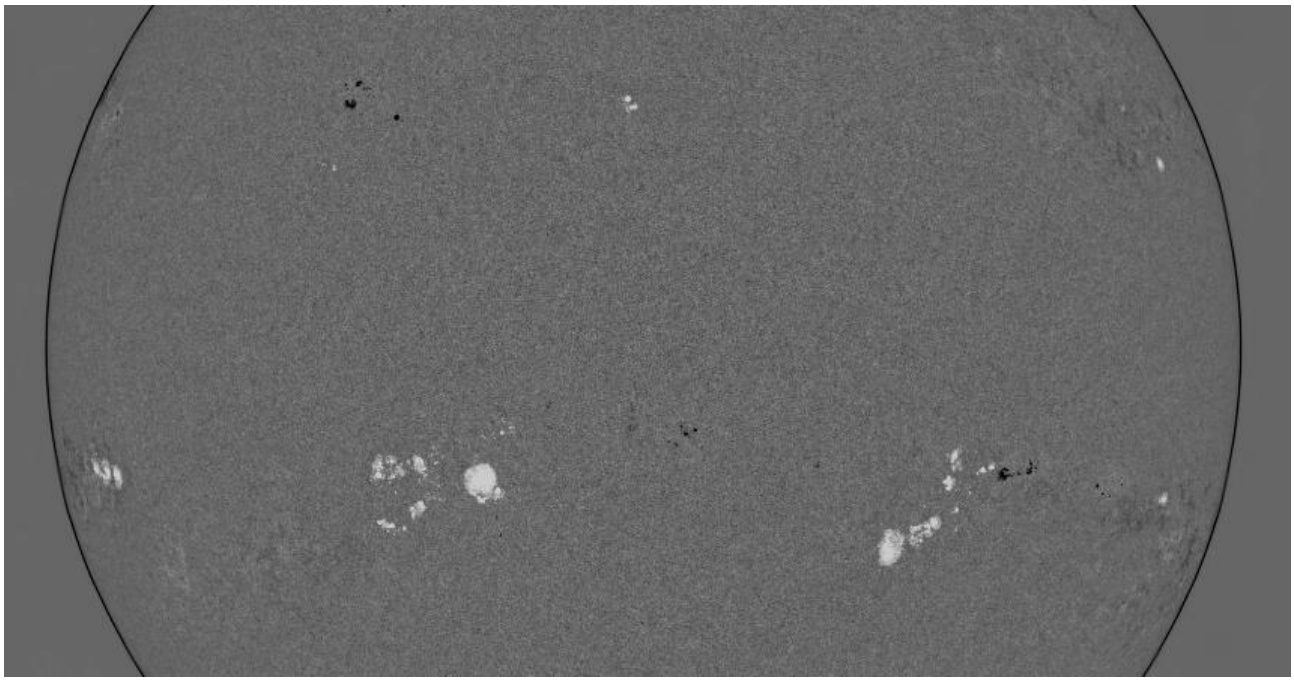
Solar Activity: Low solar activity is likely during the forecast period. There are signs that the arriving eastern solar horizon contains more potent active regions (from CME evidence,

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.

prominences and satellite imagery), with a probable increase in activity therefore considered through the coming UTC working week, and thus an increasing chance of Moderate-class flares.

Figure 1: Helioviewer.org-generated running difference imagery comparing sunspot group footprints from 27 days ago (white) to the current disc (black), showing a recent lull in the otherwise upward trend in activity towards solar maximum.



Solar Wind / Geomagnetic Activity: No definitively Earth-directed CMEs feature in the forecast at present, however given the sheer number of peripheral CMEs over the UTC weekend, confidence in this assertion is relatively low, especially from Day two, Tuesday 07 February. Non-impactful glancing transient activity is considered a possibility through the middle of the coming week.

The current slow solar wind regime is expected to give way to the fast wind around the middle of Day one, Monday 06 February. This is evidenced by a satellite around a day ahead of Earth in sampling the solar wind and the gradually increasing number of particles and their magnetic field strength in the near-Earth environment. This will lead to a chance of Minor Geomagnetic Storm G1 in the current UTC day. A residual slight chance of G1 should then continue into Day two, before a probable reduction to quiet from midweek.

Energetic Particles / Solar Radiation: No solar radiation storms are expected.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	20	5	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	10	20	30	30
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.